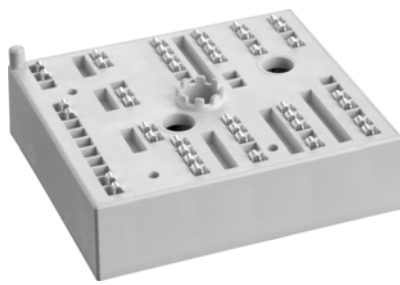


SKiiP 23NAB12T4V1



MiniSKiiP® 2

SKiiP 23NAB12T4V1

Features

- Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

Typical Applications*

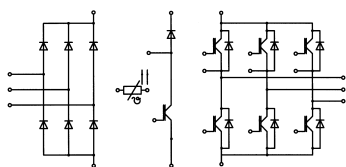
- Inverter up to 14 kVA
- Typical motor power 7,5 kW

Remarks

- Max. case temperature limited to $T_C=125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended $T_{j,op} = -40 \dots +150^\circ\text{C}$)
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information

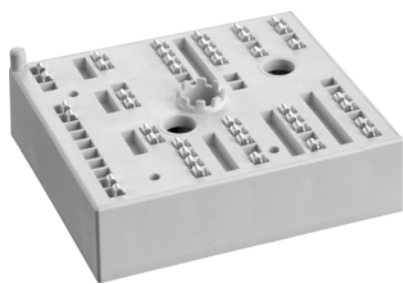
Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	37	A
	T _j = 175 °C	T _s = 70 °C	30	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	41	A
	T _j = 175 °C	T _s = 70 °C	34	A
I _{Cnom}			25	A
I _{CRM}	I _{CRM} = 3 x I _{Cnom}		75	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	µs
T _j			-40 ... 175	°C
Chopper - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	37	A
	T _j = 175 °C	T _s = 70 °C	30	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	41	A
	T _j = 175 °C	T _s = 70 °C	34	A
I _{Cnom}			25	A
I _{CRM}	I _{CRM} = 3 x I _{Cnom}		75	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	µs
T _j			-40 ... 175	°C
Inverse - Diode				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	32	A
	T _j = 175 °C	T _s = 70 °C	26	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	35	A
	T _j = 175 °C	T _s = 70 °C	28	A
I _{Fnom}			25	A
I _{FRM}	I _{FRM} = 3 x I _{Fnom}		75	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		100	A
T _j			-40 ... 175	°C
Freewheeling - Diode				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	32	A
	T _j = 175 °C	T _s = 70 °C	26	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	35	A
	T _j = 175 °C	T _s = 70 °C	28	A
I _{Fnom}			25	A
I _{FRM}	I _{FRM} = 3 x I _{Fnom}		75	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		100	A
T _j			-40 ... 175	°C



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SKiiP 23NAB12T4V1



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Typical Applications*

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- Typical motor power 7,5 kW

Remarks

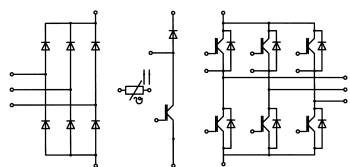
- Max. case temperature limited to $T_C=125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended $T_{j,op} = -40 \dots +150^\circ\text{C}$)
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Rectifier - Diode				
V _{RRM}	T _j = 25 °C		1600	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	52	A
	T _j = 150 °C	T _s = 70 °C	39	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	58	A
	T _j = 150 °C	T _s = 70 °C	44	A
I _{Fnom}			13	A
I _{FSM}	10 ms	T _j = 25 °C	370	A
	sin 180°	T _j = 150 °C	270	A
I ² t	10 ms	T _j = 25 °C	685	A ² s
	sin 180°	T _j = 150 °C	365	A ² s
T _j			-40 ... 150	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring		40	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, 1 min		2500	V

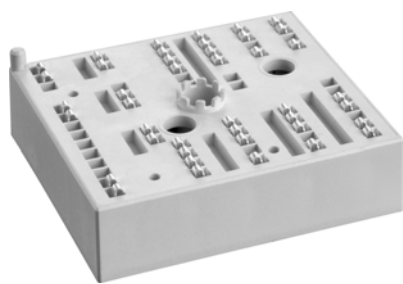
Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 25 \text{ A}$ $V_{GE} = 15 \text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.85	2.10	V
		$T_j = 150^\circ\text{C}$	2.25	2.45	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$	0.80	0.90	V
		$T_j = 150^\circ\text{C}$	0.70	0.80	V
r_{CE}	$V_{GE} = 15 \text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	42	48	mΩ
		$T_j = 150^\circ\text{C}$	62	66	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE} \text{ V}$, $I_C = 1 \text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0 \text{ V}$, $V_{CE} = 1200 \text{ V}$, $T_j = 25^\circ\text{C}$		0.1	0.3	mA
C_{ies}	$V_{CE} = 25 \text{ V}$ $V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$	1.43		nF
C_{oes}		$f = 1 \text{ MHz}$	0.12		nF
C_{res}		$f = 1 \text{ MHz}$	0.09		nF
Q_G	$V_{GE} = -8 \text{ V} \dots +15 \text{ V}$		142		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		0		Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$ $I_C = 25 \text{ A}$	$T_j = 150^\circ\text{C}$	28		ns
t_r	$R_{G on} = 24 \Omega$ $R_{G off} = 24 \Omega$	$T_j = 150^\circ\text{C}$	40		ns
E_{on}		$T_j = 150^\circ\text{C}$	2.65		mJ
$t_{d(off)}$	$V_{GE} = +15/-15 \text{ V}$	$T_j = 150^\circ\text{C}$	295		ns
t_f		$T_j = 150^\circ\text{C}$	68		ns
E_{off}	$V_{GE} = +15/-15 \text{ V}$	$T_j = 150^\circ\text{C}$	2.3		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=0.8 \text{ W/(mK)}$		1.2		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=2.5 \text{ W/(mK)}$		1		K/W



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SKiiP 23NAB12T4V1



MiniSKiiP® 2

SKiiP 23NAB12T4V1

Features

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- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

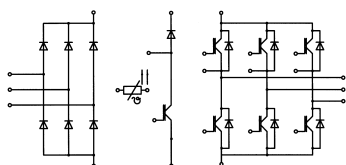
Typical Applications*

- Inverter up to 14 kVA
- Typical motor power 7,5 kW

Remarks

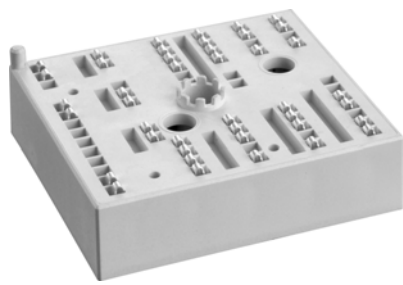
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- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Chopper - IGBT						
V _{CE(sat)}	I _C = 25 A	T _J = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chipelevel	T _J = 150 °C		2.25	2.45	V
V _{CE0}	chipelevel	T _J = 25 °C		0.80	0.90	V
		T _J = 150 °C		0.70	0.80	V
r _{CE}	V _{GE} = 15 V	T _J = 25 °C		42	48	mΩ
	chipelevel	T _J = 150 °C		62	66	mΩ
V _{GE(th)}	V _{GE} = V _{CE} V, I _C = 1 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V, V _{CE} = 1200 V, T _J = 25 °C			0.1	0.3	mA
Q _G	V _{GE} = - 8 V...+ 15 V			142		nC
R _{Gint}	T _J = 25 °C			0		Ω
t _{d(on)}	V _{CC} = 600 V	T _J = 150 °C		28		ns
t _r	I _C = 25 A	T _J = 150 °C		40		ns
E _{on}	R _{G on} = 24 Ω	T _J = 150 °C		2.65		mJ
t _{d(off)}	R _{G off} = 24 Ω	T _J = 150 °C		295		ns
t _f		T _J = 150 °C		68		ns
E _{off}	V _{GE} = +15/-15 V	T _J = 150 °C		2.3		mJ
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			1.2		K/W
R _{th(j-s)}	per IGBT, λ _{paste} =2.5 W/(mK)			1		K/W
Inverse - Diode						
V _F = V _{EC}	I _F = 25 A	T _J = 25 °C		2.41	2.74	V
	V _{GE} = 0 V chipelevel	T _J = 150 °C		2.45	2.79	V
V _{F0}	chipelevel	T _J = 25 °C		1.30	1.50	V
		T _J = 150 °C		0.90	1.10	V
r _F	chipelevel	T _J = 25 °C		44	50	mΩ
		T _J = 150 °C		62	68	mΩ
I _{RRM}	I _F = 25 A	T _J = 150 °C		24		A
Q _{rr}	di/dt _{off} = 850 A/μs	T _J = 150 °C		3.7		μC
E _{rr}	V _{GE} = -15 V V _{CC} = 600 V	T _J = 150 °C		1.6		mJ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			1.52		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			1.29		K/W
Freewheeling - Diode						
V _F = V _{EC}	I _F = 25 A	T _J = 25 °C		2.41	2.74	V
	V _{GE} = 0 V chipelevel	T _J = 150 °C		2.45	2.79	V
V _{F0}	chipelevel	T _J = 25 °C		1.30	1.50	V
		T _J = 150 °C		0.90	1.10	V
r _F	chipelevel	T _J = 25 °C		44	50	mΩ
		T _J = 150 °C		62	68	mΩ
I _{RRM}	I _F = 25 A	T _J = 150 °C		24		A
Q _{rr}	di/dt _{off} = 850 A/μs	T _J = 150 °C		3.7		μC
E _{rr}	V _{GE} = -15 V V _{CC} = 600 V	T _J = 150 °C		1.6		mJ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			1.52		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			1.29		K/W



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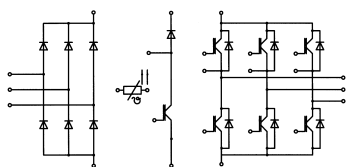
Typical Applications*

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Remarks

- Max. case temperature limited to $T_C=125^\circ\text{C}$
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- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Rectifier - Diode						
V _F = V _{EC}	I _F = 13 A	T _j = 25 °C		1.00	1.21	V
	V _{GE} = 0 V chiplevel	T _j = 125 °C		0.90	1.10	V
V _{F0}	chiplevel	T _j = 25 °C		0.88	0.98	V
		T _j = 125 °C		0.73	0.83	V
r _F	chiplevel	T _j = 25 °C		9.2	18	mΩ
		T _j = 125 °C		13	21	mΩ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			1.25		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			1.06		K/W
Module						
M _s	to heat sink		2	2.5		Nm
w				55		g
L _{CE}				-		nH
Temperature Sensor						
R ₁₀₀	T _r = 100 °C			1670 ± 3%		Ω
R(T)	R(T)=1000Ω[1+A(T-25°C)+B(T-25°C) ²], A = 7.635*10 ⁻³ °C ⁻¹ , B = 1.731*10 ⁻⁵ °C ⁻²					



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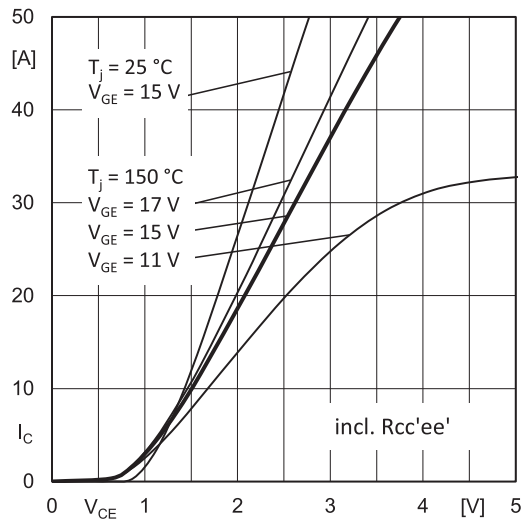


Fig. 1: Typ. output characteristic

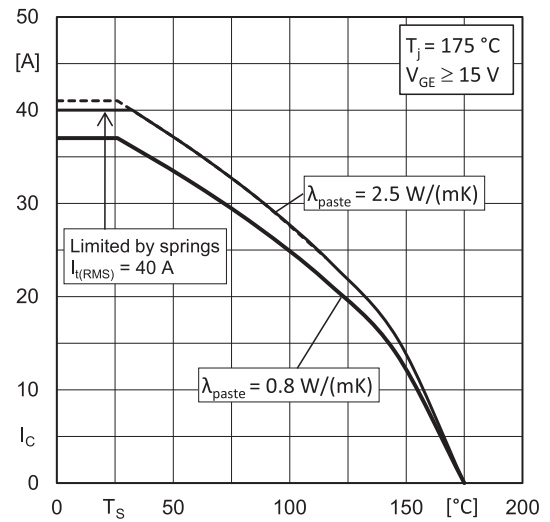


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

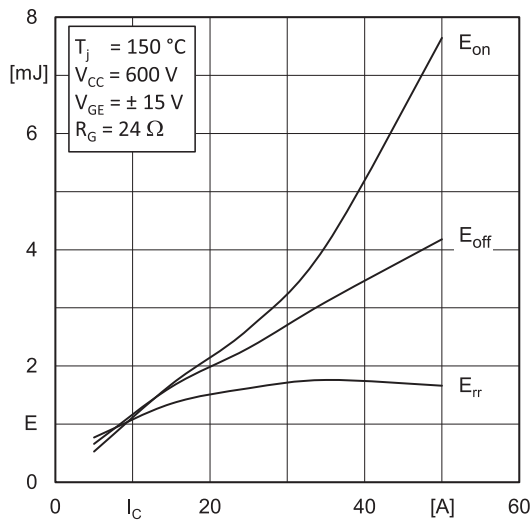


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

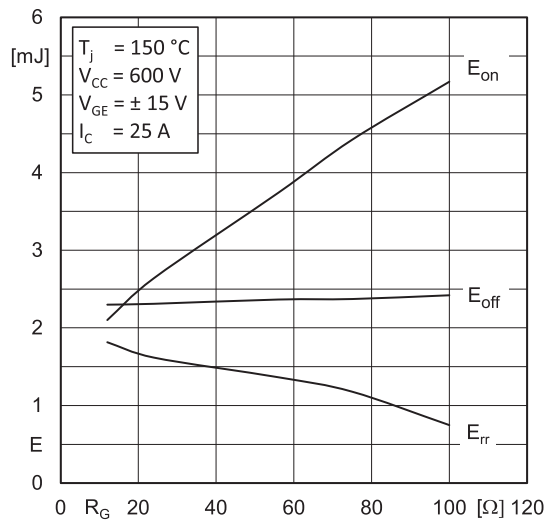


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

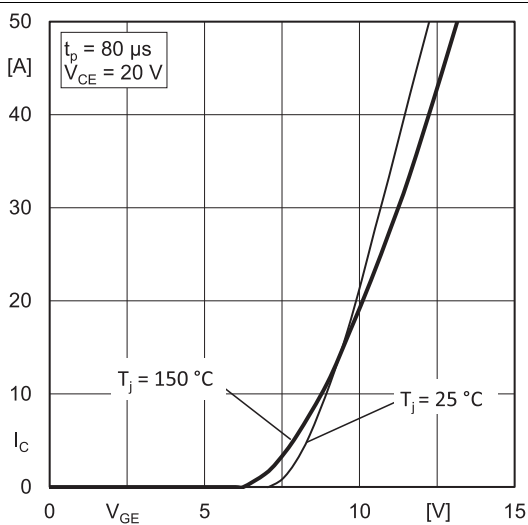


Fig. 5: Typ. transfer characteristic

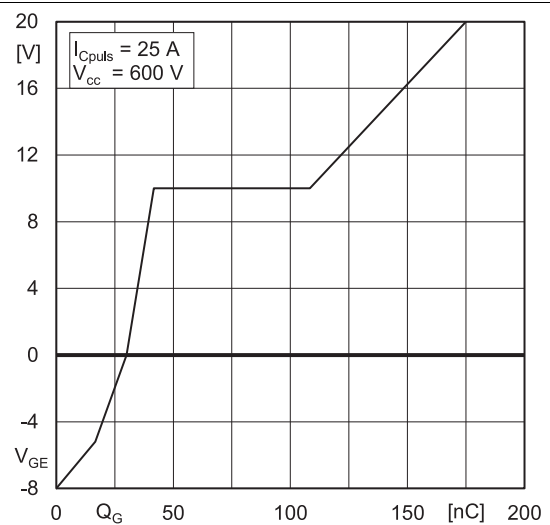
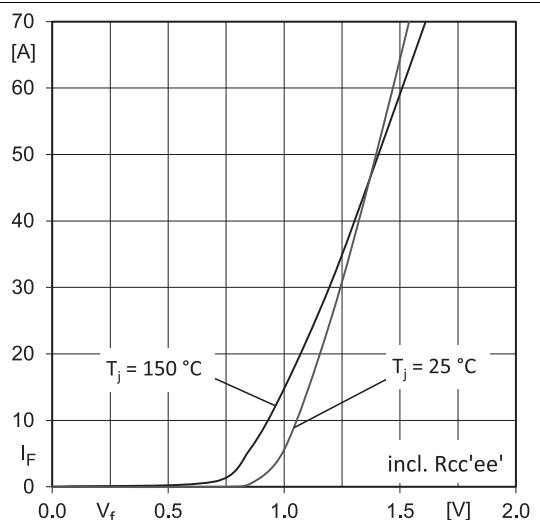
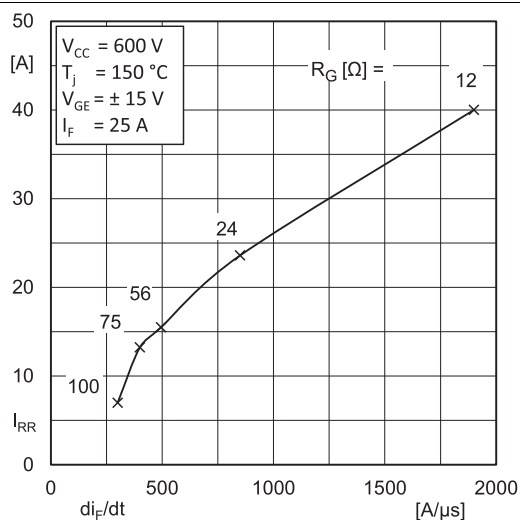
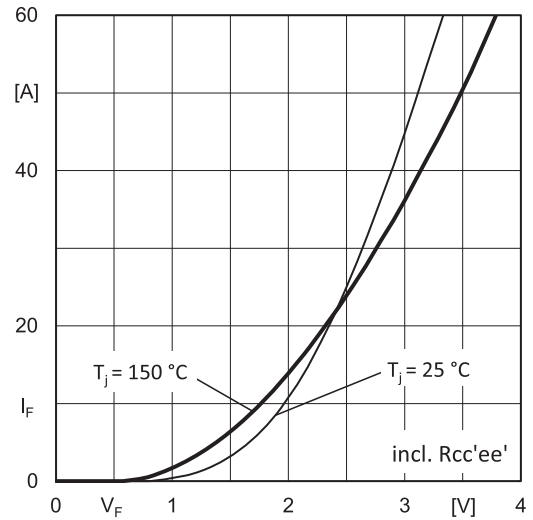
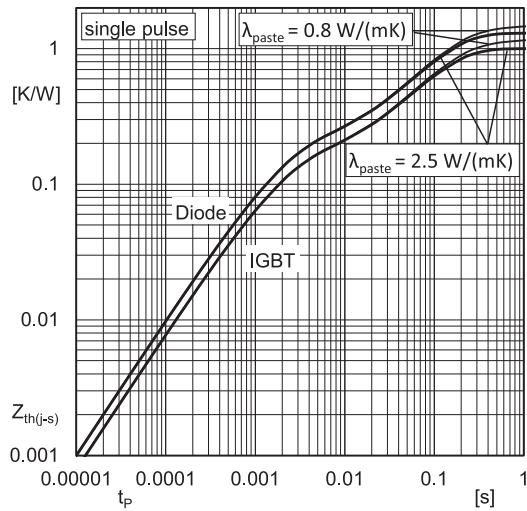
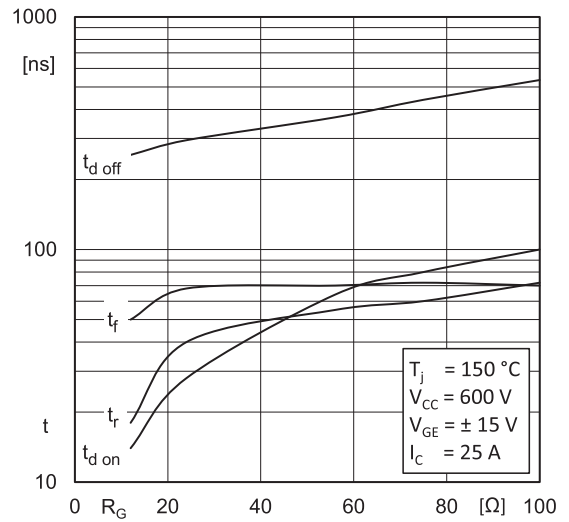
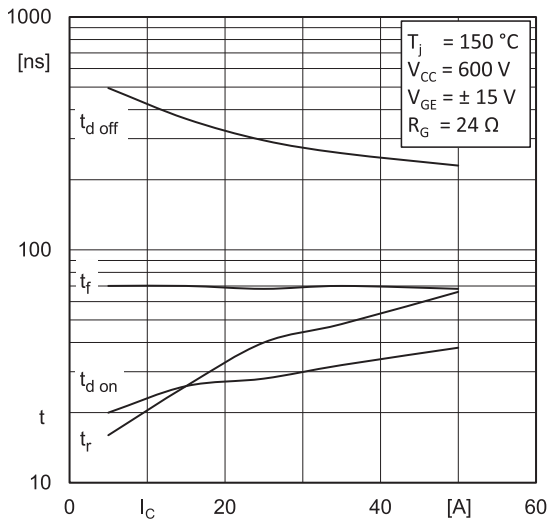
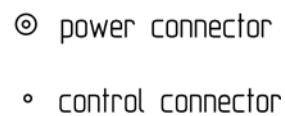
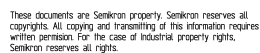


Fig. 6: Typ. gate charge characteristic





This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

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